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## Engineering Difference

*Women's Accounts of Working as Technical Assistants in the BBC Television Service between 1946 and 1955*

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**ABSTRACT** The experiences of women engineers working in the BBC Television Service at Alexandra Palace, London, during the 1940s and 1950s, give insights into gender discrimination in broadcasting. These women first joined as radio engineers when the BBC was recruiting women during World War II, then transferred to television between 1946 and 1947. In interviews recorded in the 1990s, they talk about incidents of bullying and exclusion by men on crews who were hostile to women doing engineering jobs. Other memories are about being demoted from positions on camera and sound to vision mixing when the BBC Staff Association negotiated new grading for cameramen with BBC management at the expense of its female members. As the Television Service became established, women were eased out of skilled and responsible jobs when men returning from the war regained their positions in broadcast engineering. **KEYWORDS** Alexandra Palace, BBC, engineers, television, women

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Gender discrimination in the Engineering Division of the British Broadcasting Corporation (BBC) Television Service is mentioned in a number of audio recordings conducted by the Alexandra Palace Television Society (APTS). Members of APTS have convened since 1992 to reminisce about working in the new BBC Television Service when it was based at Alexandra Palace, Muswell Hill, London.<sup>1</sup> Their first reunion at Alexandra Palace led to the Society initiating a project to record their members' memories on audio cassette and in written submissions, as well as to contribute their collections of objects, video recordings of programs, photographs, documents, books, ephemera, and memorabilia to form the APTS archive.<sup>2</sup> The BBC first ran television as an experimental service from Alexandra Palace between 1936 and 1939, airing programs live for limited hours while testing two different systems of television broadcasting.<sup>3</sup> The British government suspended television broadcasting for the duration of World War II. Live television resumed in 1946 at Alexandra Palace

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FIGURE 1. Beryl Hockley with a vision mixer, fading up the Television Service, June 7, 1946, when it reopened after World War II. Alexandra Palace Television Society.

and continued there until 1952, when the Television Service relocated to newly built studios at Television Centre, Lime Grove, Shepherd's Bush, London.

The BBC was established in 1922 as a private company that broadcast radio, before it became a publicly funded corporation through a monopoly license fee granted by royal charter. The license, which prohibited all forms of sponsorship or advertising, covered radio listeners starting in 1927 and television viewers starting in 1946, and was regulated by the General Post Office. The BBC, controlled by a director general and a board of governors, held its monopoly on public service broadcasting from its beginnings in 1922 up until the Television Act of 1954, which enabled commercial television to be launched under the Independent Commercial Authority.<sup>4</sup>

I listened to the APTS audio recordings as part of my research on television in Britain between 1936 and 1952, when the Television Service was based at Alexandra Palace.<sup>5</sup> One aspect of everyday life at the Palace covered in the collection is that of women's work experiences. A group discussion recorded in 1994 by four women members of APTS who worked in the Engineering Division of the BBC Television Service during the 1940s and 1950s throws light on what it was like to be a woman in jobs that men traditionally occupied.<sup>6</sup> Other subsequent individual recordings, initiated by Muriel Powell, one of the four women

engineers, corroborate these memories. Powell played an active role in ensuring that the APTS oral history collection represented its female members. She had first hosted the recordings of APTS sound engineers on crew A, and was the only woman in that convened group.<sup>7</sup> She was unable to record much about her own working experience compared to the male engineers, whose stories dominate the recording, and later convened the discussion among the four female engineers.<sup>8</sup> Following that she interviewed Vera Seaton Reid, a vision mixer, then eighty-four years old.<sup>9</sup> Finally she wrote to Molly Brownless to solicit her story, and the latter recorded her contribution on an individual audio cassette sent to Powell, now in the APTS archive.<sup>10</sup> It is thus thanks to Powell's efforts that many aspects of women's experiences of working life at Alexandra Palace are preserved.

These accounts by women who worked for the Television Service prompted me to conduct further interviews myself with female members of APTS to gain more context and detail about their experiences in the BBC.<sup>11</sup> In this article, I draw on all of these recordings—the APTS recordings, my own interviews, and one earlier recorded interview that is part of the British Entertainment History Project (BEHP)—as primary sources to explore how gender discrimination affected women working at Alexandra Palace.<sup>12</sup> I will consider these oral sources in relation to what the BBC Written Archives and existing histories of broadcasting in Britain tell us about the roles of women working for the BBC in the 1940s and 1950s.

## ORAL HISTORY AS A METHODOLOGY IN WRITING HISTORIES OF WOMEN IN TELEVISION

As I have argued elsewhere, recognizing the complexities of using oral accounts as a source for history, and being alert to issues in their use and interpretation, is important for drawing out their rich and unique contribution to media histories.<sup>13</sup> As a whole, the APTS archive recordings offer, as its members intended, “a record of what it was like and how it happened between the late 1930s and early 1950s for future archive use.”<sup>14</sup> Until the APTS archive was formed, the key sources on the Television Service at Alexandra Palace were institutional histories: Asa Briggs's five-volume *The History of Broadcasting in the United Kingdom* (1961–95) and programs and publications produced by the BBC itself.<sup>15</sup> While Briggs recognized the importance of oral sources and regarded them as “the most vivid of historical sources,” he also thought they were the most unreliable.<sup>16</sup> His use of oral history was primarily empirical, to corroborate or enlarge on what he had found in the BBC Written Archives. Yet the oral history collection of the

APTS archive reveals far more than empirical evidence. Its records of group and individual reminiscences, personal and subjective accounts, offer nuanced detail of everyday life and attitudes not available in the institutional archive.

The APTS oral history collection provides us with a good example of what has been conceptualized in social psychology as “transactive memory” and used by Graham Smith in oral history. In his discussion of the importance of group oral recordings, Smith proposes that what makes memory “social” is talk, and that remembering is often a shared project.<sup>17</sup> This process of remembering refers to communication in groups that stimulates and pools memories among individuals. Smith argues that undertaking group interviews, especially alongside individual interviews, can enhance transactive memory.<sup>18</sup> The APTS collection shows how transactive memory among members of the Society has contributed to recording working conditions in the Television Service that are otherwise undocumented, or only partially or indirectly referred to in the BBC Written Archives.

Oral history is particularly pertinent to methodologies that are useful for assessing women’s contributions to television. Recent scholarship into women’s participation in film and television advocates diverse and imaginative methodologies of historical research. Women’s roles are often absent from formal archives, and there is a scarcity of records of their participation in these industries.<sup>19</sup> Oral histories offer innovative ways to research television, but up until recently have been little utilized. Feminist approaches to history are gender conscious when interviewing participants and interpreting their oral accounts. Feminist researchers using oral history methodologies have observed that women often recall and articulate their memories differently than male respondents do—for instance they are more likely to remember emotional and subjective experiences of their working lives, admit to mistakes, and recall learning new skills.<sup>20</sup> Within the context of meeting other women who had worked in the same jobs, the APTS women were keen to go on record with their experiences of gender inequality. Their accounts reveal instances of bullying and discrimination on the part of some men in the crews. Listening to these records reveals vital but neglected aspects of the day-to-day experiences of women working in engineering in the BBC. But before discussing what the accounts reveal about the Television Service, it is important to understand how women began working in BBC radio engineering before they entered the Television Service.

## **WOMEN IN BBC RADIO ENGINEERING**

The Engineering Division employed a large number of staff to cover a range of positions in radio and then in the new Television Service. The jobs required

different technical skills, particularly as engineers were employed to work in the studio or on the transmitter, in operations and maintenance. There was also work in research, recording and transmission (sometimes referred to as “lines”), equipment, and installation. There were senior maintenance engineers, junior maintenance engineers, and technical assistants. According to Kate Murphy, prior to World War II, one-third of established staff at the BBC were engineers, and they were all men. In her groundbreaking and detailed study of women in radio at the BBC between 1922 and 1939, Murphy makes the case that women have been “largely left out of the historiography of the BBC.” She observes that the BBC, which was pioneering broadcasting as an emerging new media technology and medium of communication, promoted a modern and creative outlook and an ethos of equality compared to other institutions and public services such as the civil service, the teaching profession, and banking. She draws evidence from the archives that women’s presence and role were crucial in shaping the BBC in its early years. In the 1920s and 1930s, as a new and enlightened employer, the BBC was offering opportunities and careers for women in a range of secretarial, clerical, and production jobs, and key women rose to prominence. Murphy contends, however, that “this is not to say that sexual discrimination did not exist at the BBC. Practices such as the gender stereotyping of roles as well as segregation, which were the norm at the time, were evident amongst secretarial and clerical staff.”<sup>21</sup> She shows how inequality was embedded in the ways in which women were contracted in these segregated jobs, such as catering, secretarial and clerical staff, duplicating machine operators, and telephonists. One example of inequality is that they were mostly paid an hourly wage rather than salaried, which would have represented more permanent and secure positions. There were some salaried women in non-segregated posts in Administration, Programmes, Public Relations, and the role of personal secretary, but even in these sectors there were gender discrepancies in pay and promotion.

Women suddenly began to be recruited into the BBC Engineering Division in 1941, when men between the ages of nineteen and twenty-three were called up for wartime military service. Edward Pawley, then a chief engineer, described the BBC management decisions that led to women gaining entry into radio in the BBC Engineering Division in his detailed history of BBC engineering, written on the occasion of the fiftieth anniversary of broadcasting. Drawing on BBC Engineering Division files, Pawley observed that “by March 1941 nearly 400 [men] had left to serve in the Forces,” which occurred simultaneously with what he called “the unprecedented expansion of broadcasting”: “one of the besetting problems of the war was to find enough people to man the transmitters

and studio centres.”<sup>22</sup> With the loss of so many male staff, BBC management specifically advertised for women to do technical assistant work in radio in the Engineering Department.

The advertisement in June 1941 in London and provincial papers and *The Listener*, the BBC’s weekly magazine, called for female operators between the ages of twenty-one and thirty-five.<sup>23</sup> Seven women started that same month and were trained at the new BBC Engineering Training School, then placed at London stations. Shortly afterward, twenty-one women were recruited and trained to work in service mostly in the country’s provincial regions. Briggs notes that just over a year later it had trained 707 new staff, 465 of them women.<sup>24</sup> By the end of 1942 there were five hundred female operators, and by the end of 1943, six hundred working in the sixty-one stations. Eight hundred women had been trained at the school by the time the war ended, and were employed on maintenance and program work as well as on transmission stations. The recruitment of women started by training female engineers as technical assistants in operations in the studios and control rooms, and shortly afterward, in spite of opposition from (male) senior maintenance engineers, they were also trained to work on the transmitters. A four-week technical training course was introduced at the BBC Engineering Training School in 1943 that enabled women to gain promotion to maintenance engineer, which meant they could do maintenance work without supervision.<sup>25</sup> Sir Noel Ashbridge, BBC chief engineer from 1929 to 1943, publicized his view at the time that “the experiment of recruiting women and training them for technical work has been an undoubted success.”<sup>26</sup>

Pawley devotes three pages of his book to discussion of how the arrival of women into engineering jobs during the war enabled the BBC to run its expanding radio services. His evidence, taken from the BBC Written Archives files on the Engineering Division, two of which in particular are devoted to women operators, draws on memorandums by members of BBC management, some of whom were in favor of employing women. In particular P. A. Florence, who was the engineering establishment officer and dealt with engineering staffing, actively ensured their training and promotion.<sup>27</sup> There is also clear evidence that many male engineers were resentful toward women entering what was traditionally a purely male domain, and that this caused difficulties for some BBC managers. E. H. Wheeler, superintendent engineer (transmitters), wrote to engineers-in-charge at control centers and transmitting stations who were reported to be “restricting the activities of the women TAs [technical assistants]” and “seriously retarding their progress.”<sup>28</sup> This opposition on the part of their superiors to



women doing more than just basic operations work is clearly documented in both Pawley's pages and the Engineering Division files in the BBC Written Archives. The question of what women *were* allowed to do in operations and maintenance is debated. Their status in employment, their pay scales and promotion prospects, and their ability to manage are all discussed and disputed in internal memorandums, in spite of evidence of their ability to learn technical skills and pass the training exams in technical operations, at all levels: A, B, C, D, and E grades. A and B grades covered basic written and practical training in broadcasting engineering for studios and control rooms, and C, D, and E involved written examinations for promotion from technical assistant roles (later renamed technical operators) to maintenance engineer roles.

Many women gave up work at the end of the war in 1945, when men started to return to civilian life. At the BBC, women were not required to relinquish their posts to men returning to work; they were transferred from transmitting stations to studios to make way for experienced male engineers, but returning men were often relocated elsewhere. Women were still needed in the Engineering Division after the war because conscription for military service was still in operation up until 1957, and only ended completely in 1960. The BBC Written Archives, however, do not give a clear picture as to what happened to women employed in the BBC's Engineering Division in the immediate postwar period and how things changed. This absence of follow-up is reflected in Pawley's book, which also does not give any further information about how women fared in the Engineering Division, even though it covers the history of BBC engineering through 1972. We do know from the APTS archive that the BBC advertised for women to work in engineering in television when the service reopened in 1946, and that some women working in radio transferred to television. I shall turn now to the APTS audio recordings to discuss what they reveal about their experiences.

## **LISTENING TO THE ORAL HISTORIES RECORDED BY WOMEN WORKING IN EARLY TELEVISION ENGINEERING**

### **The Group Audio Recording**

The four women in APTS who met as a group on the initiative of Muriel Powell introduce themselves on the audio recording and explain how they joined the BBC during, or directly after, the war. We come to learn that two of them, Gladys Davies (GD) and Muriel Powell (MP), answered advertisements, and the other two, Bimbi (Barbara) Harris (BH) and Mary Ticehurst (MT), heard by word of mouth that women were being recruited as engineers. They all worked



in radio before applying to transfer to the Television Service at Alexandra Palace between 1946 and 1947. However, while they had received training in radio, when they joined the Television Service they received very little training. This becomes clear when the subject of how they were treated by their male colleagues upon their arrival at Alexandra Palace first enters the conversation:

BH: Telecine! Nobody taught me anything, so when I first picked it up it went backwards and frontways and sideways and inside out and you just had to learn by yourself [from] your own mistakes.

GD: I nearly put the film on upside down.

BH: That's right. Nobody told you anything, it's extraordinary.

GD: No they didn't; they didn't notice what I'd done. [laughs]

BH: No, they just said, "Get on with it, find out."<sup>29</sup>

Harris starts to talk about her memory of pushing a heavy male cameraman on a crab (a sideways track), and one of the others joins in, saying the reason it was so difficult was because the floor in Studio B where the camera was to be tracked had an incline. Davies, who at first has difficulty remembering this activity, suddenly interjects:

GD: Yes, I do remember doing this. I think they wanted to prove to me that I couldn't do it. When I tried to push it, I nearly pushed it into the grand piano.

BH: That's right, so the girls had all the dirty jobs of clearing the cables when we had to take them out to the gardens. Fred—what was it? Fred the gardener, Fred Streeter. And these cables used to go out and the women used to handle the cable and bring it back.

MP: Well, it's curious you should say that, because at a later stage I was saying, "Why couldn't women become sound mixers?" and the story at that time was, "Oh, well, they would have to train as boom operators and heave cameras and cables about, and they couldn't do that, therefore they couldn't become sound operators."

MT: So we were told different stories, obviously.

MP: Yes.

Here the women identify how the men working in television engineering put them to the test physically to prove what they could manage. They identify the challenging behaviors and contradictory statements made by some of the

men as to their capabilities in doing the tasks the job involved. In this case, men on the crew gave women heavy tasks while evaluating their gender difference in terms of physical strength. At the same time, the women were told that they could not learn skills such as camera and sound, since they were not as strong as men. The next issue they turn to is men refusing to be supervised by women.

BH: After two years I used to say, "I know that job, what else can I do now?" And the only job I was denied was a lighting director. They said, "Oh, you can't have that because you've got to delegate jobs to men and you can't be in charge of men, can you?"

GD: Oh gosh, whatever next? [ . . . ]

MP: And a magazine appeared one day, I don't know where it had come from, what magazine it was, but there was an article in it headed "Dying Breed," and it was saying that the females in television were going to be removed.

GD: Is that so?

MP: Yes, they were going to come to the end of their life. I don't know who had got hold of that story.

GD: I remember a bit of general hostility to women who were doing engineering. [ . . . ]

BH: Oh yes, oh yes, I was very definitely sent to Coventry when I was on cameras.

GD: Yes, I remember certain people who were very down on women, and regretting their incursion. [ . . . ]

MP: Well, I think we had a better environment on our crew than you had on yours, because we were allowed to do almost every job but sound mixing. We were never allowed to do sound mixing.<sup>30</sup>

The women's experiences varied depending what shift they were on and/or the men they crewed with. Harris and Powell gained a lot more experience on the studio floor than the other two, and they surmised that this had to do with the younger men on their shift; it was often the older men who were resistant to women entering into work they regarded as a male preserve. Davies called the men on her shift "stuck-in-the-muds."

MP: Bimbi and I were very lucky to be on the opposite shift. We were, I think, because we were able to do so very much more.

GD: You certainly did.

BH: We did sewing in our spare time! [chuckles]

MT: Maybe we weren't as enterprising, either. I mean, I remember I didn't really want to do anything else.<sup>31</sup>

Whether Ticehurst had not wanted to seem to complain, or had in reality not been as motivated, confident, or ambitious as the others, is hard to interpret. However, her intervention into the discussion at this point somehow curtails the conversation about their treatment and opportunities, and for the rest of the recording they talk about producers they worked with. As Smith observed in his study of group reminiscing, a sudden change of topic can often take place, and it is important that researchers recognize this as an aspect of the oral history process.<sup>32</sup>

### Individual Audio Recordings and Written Submissions

Powell followed up on all this by asking another colleague, living in Australia, her opinion of the incident when Harris was “sent to Coventry” to add to the APTS archive. Interestingly, Molly Brownless (MB) had already sent a written submission to the APTS archive talking generally about the vision mixing equipment, but in it she did not discuss discrimination. In her audio cassette “letter” to Powell, she talks candidly about her experience of working in the studios and gives an account of the time Harris was ostracized: A reporter had come to Alexandra Palace, wanting to photograph one of the “girls” on camera. Brownless was told by the floor manager that she was supposed to be photographed, but as she was busy in the studio at the time, the reporter had instead photographed Harris seated on the tracking camera. This had raised the hackles of the men, Brownless says, as women were not allowed on the tracking cameras, only on the pedestal cameras. (Harris confirmed all this when I asked her about it in a separate interview, explaining that from the men's point of view she had sat on the wrong camera.)<sup>33</sup>

Having answered Powell's question about the incident with Harris, Brownless then relates how women were moved off cameras altogether at Alexandra Palace:

MB: Now the next thing that happened, and it's nothing to do with that incident at all, why I came off cameras and she [Harris] did for that matter at that time, was due to the fact that the camera people wanted to get themselves a higher grade, and they were trying to upgrade their pay in relation

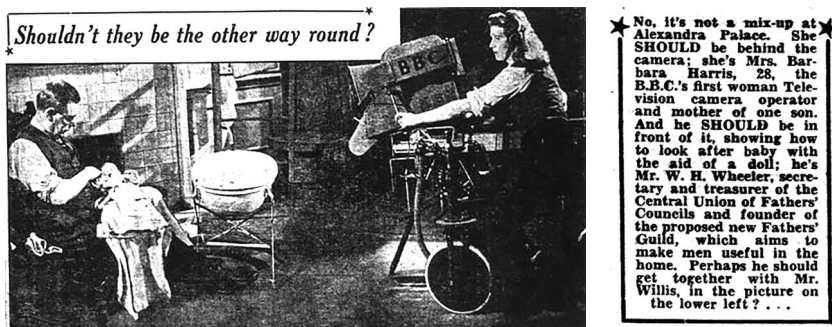


FIGURE 2. Bimbi Harris on the tracking camera. Unidentified newspaper, c.1947.

to the other operators around the joint—it was a very specialized job, et cetera, et cetera. All the cameras, as far as I know, all of them—certainly most of them and it included me—belonged to the Association of Cine-Technicians, and they were expecting this association to back their claim, and the association didn't like the idea of me being one of them because if I could do it then obviously it wasn't such a very skilled job after all. And Henry, to avoid any splitting up of the blokes in the studio, I presume, told me that I wouldn't be able to do camerawork anymore. Well, I was pretty peeved about that, as you can imagine. Not to say just peeved, I was downright sick about the whole thing.<sup>34</sup>

Brownless was offered vision mixing in compensation for being moved off cameras, and the "blokes" got their re-grading:

MB: This was rather the beginning of the sort of demarcations between various jobs when people sort of decided this was what they were going to do. It all became not quite so—intermingled, if that's the right word, between the different jobs. I don't remember ever doing sound floor again after I started vision mixing. I'd quite enjoyed that.<sup>35</sup>

When women were recruited into the service as technical assistants, they were given the jobs that junior maintenance engineers had occupied before the war: logging (writing up shot lists), cleaning racks, switchboard, telecine, dolly pushing, cable cleaning, vision mixing. Other women recruited into vision mixing were told from the start that they could not work on cameras. When Vera Seaton Reid responded to an advertisement, eight hundred women had applied for eighteen vision mixing jobs, she says. Reid had wanted to handle cameras, but was told that the heaviness of the cables prohibited women from doing so.<sup>36</sup>

Rachel Blayney (RB), who also joined in 1946, remembers in a written submission to the archive the reason she was given as to why she was on vision mixing:

RB: The day I arrived, the staff rest-room between studios A & B was like a flashback in a film with notices on the board dated September 3, 1939, and magazines on the table from August and September 1939. Most of the prewar engineers had returned and were busy cleaning and repairing all the equipment ready to start broadcasting again. Mr. Baker, the Chief Engineer Television, explained to me that he had recruited girls in the BBC for vision mixing as he considered that before the war this duty had held cameramen back from advancing in their careers. This amused me but I did feel that as a girl I was receiving a good salary in a very interesting job.<sup>37</sup>

Elizabeth MacGregor (EM), another woman on the general operations and engineering side, ended up as a highly experienced gramophone operator, but when she started, she was doing a number of different jobs:

EM: The thing was, to start with, we had two shifts, and then we had a system of crews as in films. Eventually there were seven or eight crews. That was a different setup, because before on the shifts there were seven or eight girls and you were just allotted to a particular job every day you went in, as far as I remember. But when you were on a crew, you normally went from vision mixing to gramophone operating, and then eventually there was a system whereby some concentrated entirely on vision mixing and some of the rest of us entirely on gramophone and tape operation.

Q: Is that what you did?

EM: Yes, to start with at Alexandra Palace we did everything. We did vision mixing, we did gramophone operation. There was no tape in these days; there was a central technical switchboard and [we] even sometimes did telecine film projection, and we went on the floor sometimes to do sound floor, in charge of one of the microphones, and one or two of the girls actually went on cameras, on a tracking camera.<sup>38</sup>

I was gratified to hear that the Harris story had spread and that in MacGregor's mind, women had managed to work on tracking cameras. I had no doubt that if I had asked the male engineers if women had worked on tracking cameras after the war, they would have said that they had not. When I asked MacGregor if she had encountered any resistance from male staff to her doing any particular job at Alexandra Palace, she replied:

EM: I did once. The sound mixer asked me to do the sound mixing this particular day. I know women weren't supposed to—I did it but, um, I could sense a

very, very frosty atmosphere, and I believe he got into trouble with the high-ups for having allowed me to do it, so that was the end of that. I didn't want to do it anyway, really.

Q: Would it [the frosty atmosphere] have come from the high-ups or would it have come from the engineers on the floor, as it were, who resented it?

EM: I felt it all around that day, among all of the sound staff.

Q: Would it have had to do with women moving into men's jobs after the war? That whole worry about where men were going to be after the war? Or was it more to do with pay?

EM: I don't think it was anything to do with pay; it was just a sort of sex thing. Women are not supposed to do this job and "if we let them into it, goodness knows how much competition we'll have eventually." It was the same trouble with camerawork. I believe there was quite a bit of jealousy, frankly, when producers were particularly noticing the work done by the one or two girls who did go on cameras.<sup>39</sup>

MacGregor, like Ticehurst, while mentioning the discrimination, said she "didn't want to do it anyway, really," and throughout her interview, whenever I asked whether she would have liked to have moved to different areas within the television service, she replied that she was essentially a "backroom person."

#### ENGINEERING DIFFERENCE IN THE BBC TELEVISION SERVICE

MacGregor, in her interview with me, had mentioned a period subsequent to this incident when a system was introduced in crews whereby some people were on gramophone and tape operations and others were on vision mixing. This was when the Engineering Department was restructured in 1955, and BBC Engineering management decided that women would no longer be employed as technical operators. In spite of representation by the BBC Staff Association, Engineering management argued that because television technical operations posts were to be interchangeable, it would be impossible for women to avoid particular tasks, "especially in connection with weight-lifting, which impose a physical strain."<sup>40</sup> The BBC Staff Association had negotiated that women should still be employed as vision mixers or gramophone operators, and that this could be agreed in the general policy of interchangeability. Nevertheless the corporation made the case that women could not be recruited into television technical operations, as their readmission "was open to grave objection on medical grounds."<sup>41</sup> The irony is that the audio recordings, both individual and group, reveal that

when they joined the Television Service just ten years before, the women had enjoyed and also successfully managed exactly that interchangeability in their jobs.

Brownless's account of how women were moved off cameras is confirmed by minutes of a meeting between the chief engineer, the engineering establishment officer, and the Engineering Branch Executive Committee of the BBC Staff Association about television cameramen negotiating new pay rates in 1947.<sup>42</sup> While these minutes confirm that the new rates were well received by the cameramen themselves, there had been a number of complaints from other categories of technical staff in the Television Service who also wanted better rates. By the beginning of 1948, further minutes show that BBC management and the BBC Staff Association were discussing and agreeing to a revision of the existing category and salary structure of technical assistants and the junior grades of engineer.<sup>43</sup> There is no mention of gender in these records and how this might have affected women.

The interesting thing about Harris being photographed on a tracking camera is that as far as the press was concerned, the story was newsworthy as an insight into changing gender roles and how women's employment had shifted since the war. Yet in the eyes of the women engineers, it symbolized the discrimination they experienced in the studio, both officially, in terms of what they were entitled to do, and unofficially, by men on the crews bullying them. Harris's ostracism was also an awkward example for some of the women. Harris claimed to be the first woman on cameras, and this had been subsequently reported in press reports, but Brownless, while she backed up Harris's story in terms of her ostracism and gender discrimination on camera and sound, disputed her claim to be first on cameras.<sup>44</sup> Brownless said that the "boys" had been angry that day because they thought Brownless should have been the one photographed as the first woman on cameras. There was evidently some competition among the women as to who got what jobs and opportunities.

On the other hand, in their group interview, the four women wasted no time getting to the subject of unfair treatment, an experience they all recognized. The richness of the recording lies in their exchange of stories about the important aspects of their experiences working for the BBC. Through a process of encouraging each other to remember (transactive memory), they enjoy sharing mischievous memories of the men, and relate amusing stories about their working lives. This lightness allows anecdotal conversation to flow freely for a while, in which they exchange stories about their arrival at the BBC Television Service and what they did at work. Oral historians have recognized the importance of anecdotes to oral histories as often standing in for key events and information.<sup>45</sup> Yet there is also a sense of Harris's story taking over, and the other women's experiences not being



sufficiently covered. Davies and Powell both sound keen to talk about the discrimination and lack of opportunities they experienced—this is evident from their moods and attempts to speak across the others. On the other hand, there is also a clear tone of restraint at times, as if none of the women want to appear to be complaining or disgruntled, or to name any of the men directly responsible—although they do drop a few hints. This could have been motivated by the fact that organizing the recordings for the APTS archive was about celebrating members' contributions to the Television Service and countering the official record. Powell offered to give me the unofficial story when I met her at one of the APTS reunions. Yet when I tried to interview both her and Davies separately at a later date, they both unfortunately canceled the appointments—one claiming ill health and the other a residential move—and were not keen to reschedule. It occurred to me that the real issue might be that they felt safer talking about this subject in a collective environment.

Harris was more available, and I decided to interview her in spite of, or rather because of, her earlier interview recorded in 1989 with the BEHP oral history project. In that recording, the two men interviewing her, Roy Fowler (RF), who had worked at Alexandra Palace, and John Hamilton (JH), an associate member of the Society who had worked in radio, had tried to avoid the issue of Harris's grievances, making it difficult for her to get a word in, and they often took off on a tangent to reminisce between themselves. When Harris mentions the fact that the men in the studio resented her position as a female member of the engineering staff, Fowler at first tries to change the subject:

BH: When I went onto cameras, I was resented, I was sent to Coventry.

RF: Well, let's come to that in due course. [ . . . ] How long were you in vision mixing?<sup>46</sup>

But Harris returns to it, talking about how she was not shown how to do things, and was expected by the men to figure everything out herself. Fowler and Hamilton, as union men, react by saying that it is almost inconceivable that a woman should come up against this kind of opposition, and that management should not have allowed it to go on.<sup>47</sup> When Harris persists, they ask whether she understands that the men might have felt threatened not by women per se, but by people taking their jobs. Hamilton recounts his story of how he "loathed" the "ladies" who had taken the senior maintenance jobs in radio in his absence, which had meant that he had not been able to return to Bush House, where the BBC was located in London, after the war, but had had to go to the service at

Aldenham, a different BBC location outside of London. Not dissuaded, Harris circles back to her story of ostracism, recalling how she had had to sit alone in the canteen. Eventually Fowler succeeds in changing the subject by asking her about equipment, to which she readily responds. The interview with Harris, as an isolated recording by the BEHP project, does not illuminate the fuller story of gender discrimination epitomized by the news story about a woman on a tracking camera, likely because the male interviewers were not keen to record this aspect of their members' histories.

Harris was easier for me to approach because she was much more confident and assertive than the other women. She had become a successful television director and enjoyed an interesting career while also raising a child as a single mother. My interview with her at her home in 1996 enlarged on the earlier APTS and BEHP recordings regarding her struggle for recognition. She also allowed me to copy her archive of invaluable press clippings on her career that her mother had compiled.



FIGURE 3. Bimbi Harris with Bill Ward on a vision mixer. BBC publicity picture, September 1952.

The story of Harris's ostracism had prompted Muriel Powell to follow up with Brownless and furthermore, had prompted me to discuss with Harris and MacGregor the broader issue of the experiences of female engineers. Their accounts of the discrimination they experienced as engineers were supported by the brief submissions to the archive of Rachael Blayney and Vera Seaton Reid.<sup>48</sup> Getting some of the other women to talk openly about their feelings of disappointment with their opportunities in television was more difficult. Both MacGregor and Davies said they had not particularly wanted to do certain jobs anyway, possibly because they felt awkward admitting to any regrets in their careers.

Harris had obviously got the limelight when she was young, and she was still getting it when she was older. Brownless had said on her audio-cassette "letter" that she had understood why the photographer had chosen Harris: she was prettier. In the press cuttings on Harris's career, she is referred to as a "honey blonde."<sup>49</sup> She had struggled for her career and money, and she had succeeded

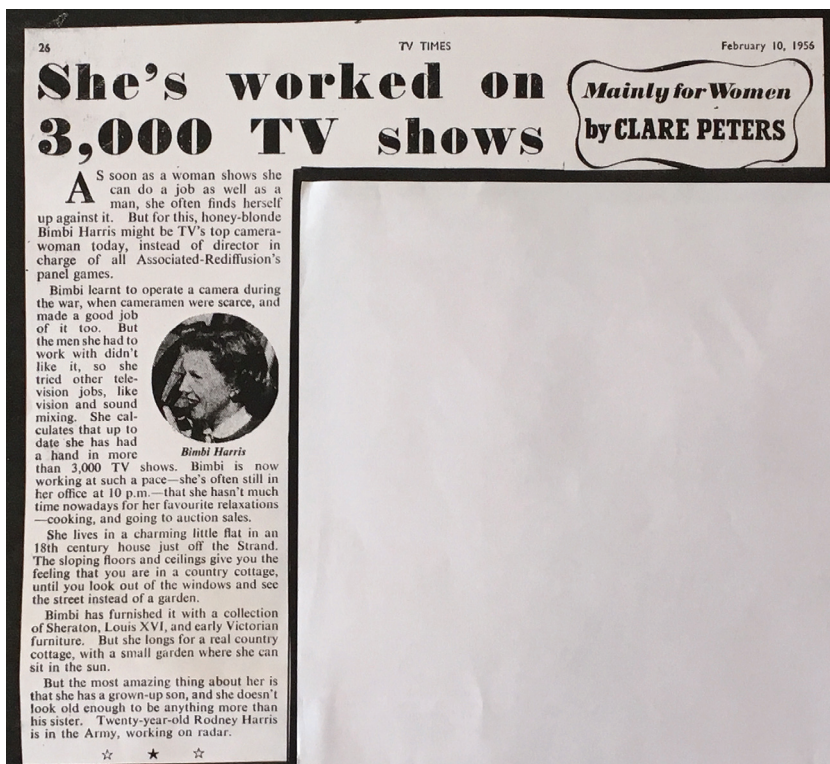


FIGURE 4. Bimbi Harris as the "honey blonde." *TV Times*, February 10, 1956, 26.

against great odds. Yet while she had experienced difficulties as a woman doing nontraditional jobs in the engineering section in television, she did not regard her problems in becoming a director later on as having to do with gender. She had tried to move to directing in the BBC, but found it impossible:

BH: Yes, I could never get across. I used to apply every time there was a director's job advertised. I'd apply, and they used to say, "You again," and I'd say, "Yes, me again!" but I could not get out of engineering.<sup>50</sup>

Harris got her break instead with the start of commercial television, into which she moved as a vision mixer, quickly becoming a director thanks to her knowledge and experience. When I asked Harris if the reason for her not getting a producer's job in the BBC might have been because she was a woman, she said it was more because she was an engineer—in other words, it was more an issue of class. She elaborated on this in her discussion with Fowler and Hamilton in the BEHP interview, where they came to the conclusion that the well-known producer-engineer divide referred to by many of the early BBC television staff was a perceived class split between the engineers, who often came from working-class backgrounds, and the programming staff, who generally came from middle-class backgrounds, went to public schools (in some countries known as private schools), and were part of the "old boy's network."<sup>51</sup> By contrast to Harris's experience, a number of male engineers at Alexandra Palace managed to move into production work through the route of stage manager in television, a post not open to women due to its supervisory duties.<sup>52</sup>

The BBC did employ women who came from middle-class backgrounds in television production. Mary Adams headed up Television Talks starting in 1936, having worked as a producer in radio; Grace Wyndham Goldie worked in Talks starting in 1948 and went on to become head of Talks, and then head of News and Current Affairs; and Freda Lingstrom became head of the Television Children's Department in 1950. The BBC also introduced television training in production in 1951, through which Wendy Toye and Yvonne Littlewood entered Light Entertainment production. While Harris's background was not working class, she did not have a university education, and ironically it was the Talks department at the BBC, run by Mary Adams, that consistently turned down her applications to become a producer. According to Harris, Adams wrote to her after Harris had left the BBC to say that she was sorry they had not given her a chance.<sup>53</sup>

One of the female engineers suggests that the trade unions did not protect their female members' interests after the war and were therefore responsible for the gender discrimination in the BBC Television Service. Brownless clearly

pointed to the ACT union as the reason she was moved off cameras and downgraded in her technical job. This happened at the beginning of union organization among the BBC technical and engineering staff. Although the union had started before World War II, it was only after the war that they began the process of collective bargaining. The Amalgamated Engineering Union had members in the BBC in the 1930s, and during the war a separate Association of BBC Engineers was established.<sup>54</sup> The BBC Staff (Wartime) Association was also given formal recognition in 1940. The BBC Staff Association, which was the result of a merger in 1945 of the BBC Staff (Wartime) Association and the Association of BBC Engineers, began to negotiate in earnest with BBC management about staff conditions and training. In particular the BBC Staff Association was concerned about the question of re-recruiting male staff returning from the war—whether men would be offered the same positions they had held before the war, or whether the BBC would offer them posts at the same or an equivalent grade. The Association of Cine-Technicians (ACT) had become active among BBC television camera staff after the war, but it was not until 1956, after the start of commercial television, that it was formally recognized by the BBC and named the Association of Cinematograph, Television and Allied Technicians (ACTT), representing broadcasting staff.<sup>55</sup> It is possible that the ACT advised its BBC members to demand the specialist grading of camera-work, which was agreed to as Brownless recounts, although it is in the BBC Staff Association minutes of their meetings with BBC management that we find this confirmation, not those of the ACT.

Through the *BBC Staff Association Bulletin* we can trace some indication of women's prospects in the BBC Engineering Division in the postwar years before commercial television. In a letter to the editor in April 1948, a writer, "Naperian" from the "London area," appraises women's contributions to operational work, with an appeal to BBC management to make their jobs more permanent. The writer poses the question: "Can not the Corporation give more hope of a settled career to a section of its Staff without whom it would at one time have been unable to carry on?"<sup>56</sup> By October of the same year, however, BBC management was demanding drastic cutbacks in broadcasting engineering staff, asking the Engineering Branch Executive Committee of the BBC Staff Association to decide which two hundred people should have their jobs terminated. The *BBC Staff Association Bulletin* indicated its commitment to equality for women in jobs:

We gave a lot of attention to the question of discriminating between men and women. Was it right to retain women, possibly married women and accept the termination of men, perhaps married men? On this particular



issue there was a good deal of debate, but it does so happen that the vast majority of the girls still remaining in the Engineering Division—only about a quarter of their original numerical strength—are by no means “pocket-money girls” but depend for their living on the job they do. Some are married and have dependents, and we could see no moral ground for advocating the termination of women in order to ensure the retention of male staff, many at least of whom could be considerably more mobile.<sup>57</sup>

While the numbers of women retained within radio engineering, as this report indicates, had dwindled to a quarter of those employed during the war, in television women had been recruited as technical assistants when the Television Service reopened in 1946. The massive expansion of the Television Service and its reorganization without sufficient resources in the next few years put a great deal of pressure on staff. Both management and producers pushed engineering staff to keep up with program developments, which exacerbated the producer-engineer divide.<sup>58</sup> This would only increase in the early 1950s, as television grew in popularity, particularly after its coverage of Queen Elizabeth II’s coronation in 1953, and as competition from commercial television became a reality. Kate Murphy argues that as the BBC expanded in a climate of competition after the war, it was less interested in a modern and pioneering image and became more conformist. She identifies areas in the BBC in the postwar period where attitudes were becoming increasingly hostile to salaried women, such as News, Outside Broadcasts, and Light Entertainment, and, notably, there were no salaried women in the Engineering Division.<sup>59</sup> As a result, she claims that the BBC recruited more men and became less fair-minded toward women: “Bureaucratisation, professionalisation and a move towards conformity would increasingly masculinize the BBC, creating the discriminatory circumstances fully evident by the 1970s.”<sup>60</sup>

It does seem clear that positive attitudes held by BBC management toward the employment of women in engineering were strategic and short-lived. There were recruitment drives for women in 1941 and 1946, and again in 1954 with the coming of commercial television and the development of BBC regional television.<sup>61</sup> Yet while women retained a foothold in the sector, examples were few and far between in the next two decades. Pawley comments that a count in 1971 revealed just “seventeen survivors of the war-time women staff in engineering operations.”<sup>62</sup> The BBC circulated its own internal report, “Women in BBC,” in 1973, which particularly criticized the Engineering Department for the lack of opportunities for women. The corporation subsequently issued a directive that going forward, no BBC jobs would be advertised for men only, and that any material produced in relation to posts such as camera operators should not

exclude women.<sup>63</sup> This was followed in 1975 by an ACTT investigation into patterns of discrimination against women in film and television in line with the new employment regulations.<sup>64</sup>

For many women the war had provided new work opportunities in the BBC, as in other sectors in Britain, particularly in nontraditional occupations. The initial influx of women into these jobs changed the single-sex nature of the engineering and technical workforce at the BBC. But as men returned from active service, they wanted their jobs back and demanded through their unions that management regrade specific jobs such as camera and sound as specialist skills, which resulted in women being moved out of these positions. Women were prevented from promotion but held on to technical assistant jobs in vision mixing and gramophone operations during the late 1940s and the first half of the 1950s.

## CONCLUSION

This investigation into gender discrimination in the BBC Television Service, between its postwar reopening in 1946 and the start of commercial television in 1955, was sparked by women remembering their working lives in oral history recordings. The narrative of gender discrimination emerges patchily, through a process of reminiscing, in the interview with the four women, and is elaborated upon and complicated in other individual written accounts and interviews with particular women. Together they make up a wider picture of women's experiences of gender inequality in the studio. While discrimination against women in radio is mentioned briefly in Pawley's history of BBC engineering during wartime, alerting researchers to the wealth of evidence to be mined in the BBC Written Archives, for the period after the war there is little written evidence of what happened to women in broadcast engineering. A feminist framework for oral history methodologies and for researching women's television history helps us to explore these archives, whether oral or written, official or unofficial, to counter how women have been marginalized in the official histories of the BBC, such as in Briggs's and Pawley's accounts. The oral recordings enrich our understanding of the experiences of women, who at times emerge in the BBC Written Archives as the subject of memorandums and deliberations by BBC management, and at other times are absent from the record. The interviews attest to patterns of gender discrimination in the BBC Television Service during the 1940s and early 1950s leading up to the arrival of commercial television, which would transform the television environment and opportunities for work in the broadcasting sector. ■



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## NOTES

Special thanks to Vicky Ball and Kate Murphy for their generous help. Special thanks also to Jacqueline Maingard.

1. The audio recordings from the APTS collection are henceforth referred to as “APTS recording” followed by the number of the recording. There are fifty-two hours on audio cassette in twenty-seven recordings by APTS members made between 1992 and 1993. There are eleven individual and sixteen group recordings. There are also fourteen written submissions of individual memories. The recordings and written submissions are not available online but are held in the APTS archive: <http://www.pts.org.uk>.

2. The APTS archive has been collected, added to, and held on behalf of the APTS by an independent curator, Simon Vaughan, who has been actively involved in promoting a BBC Television museum at the studios of Alexandra Palace to house the collection. The archive currently holds nearly five thousand individual items. I am grateful to Vaughan for the archive materials he provided for this research.

3. For the history of the early years of television see Mark Aldridge, *The Birth of British Television: A History* (London: Palgrave Macmillan 2012); Asa Briggs, *Sound and Vision*, vol. 4 of *The History of Broadcasting in the United Kingdom* (Oxford: Oxford University Press, 1979); Keith Geddes and Gordon Bussey, *Television: The First Fifty Years* (Bradford, England: National Museum of Photography, Film and Television, 1986); Bruce Norman, *Here’s Looking at You: The Story of British Television 1908–39* (London: BBC and Royal Television Society, 1984).

4. For a discussion as to how commercial radio in the United Kingdom was legalized in the 1970s see Asa Briggs, *Competition*, vol. 5 of *The History of Broadcasting in the United Kingdom* (Oxford: Oxford University Press, 1995); Andrew Crisell, *An Introductory History of British Broadcasting* (London and New York: Routledge, 1997), 132–47.

5. See Emma Sandon, “From Vision to Mundanity: Television at Alexandra Palace, London, 1936–1952: Memories of Production. An Oral History Approach to the Reassessment of the Early Period of British Television History” (DPhil, University of Sussex, 2004). Chapter 6 was used as the basis for this article.

6. APTS recording no. 23.

7. APTS recording nos. 4, 9.

8. APTS recording no. 23.

9. APTS recording no. 16. A vision mixer selects and edits different visual sources for live broadcast.

10. APTS recording no. 5.

11. My additional interviews with members of APTS are referenced as “author interview,” with the name of the interviewee and the date of the recording. These interviews are not available online.

12. British Entertainment History Project (BEHP) interview no. 100, Barbara (Bimbi) Harris, August 30, 1989. The original audio cassette is held in the British Film Institute (BFI) library. A digital copy of the recording is available online together with a full transcription in a PDF file, as well as a partial transcription, on the BEHP website (<https://historyproject.org.uk/interview/barbara-bimbi-harris/>); at *Learning on Screen* (<http://bufvc.ac.uk/womenswork/oral-histories/bectu-oral-histories>); and on the BFI’s *Screenonline* (<http://www.screenonline.org.uk/audio/id/953819/index.html>). The BEHP is an important audio and audiovisual collection of interviews with people who worked in British film and television. The history project is run by the Broadcasting, Entertainment, Communications and Theatre Union (BECTU), formerly called the Association of Cinematograph, Television and Allied Technicians (ACTT). I am grateful to BEHP for permission to draw on this source.

13. See Emma Sandon, “Nostalgia as Resistance: The Case of the Alexandra Palace Television Society and the BBC,” in *Re-viewing Television History: Critical Issues in Television Historiography*, ed. Helen Wheatley (London: I. B. Tauris, 2007), 99–112.

14. Letter by Michael Henderson, APTS organizer, BBC outside broadcasts producer, in “Reuniting Pally Pioneers of the World’s First TV Service,” *Prospero* (internal BBC magazine), 1992, 12.

15. Asa Briggs, *The History of Broadcasting in the United Kingdom*, 5 vols. (Oxford: Oxford University Press, 1961, 1965, 1970, 1979, 1995). Volume 4, *Sound and Vision*, is the relevant source for the 1940s and 1950s. See Sandon, “From Vision to Mundanity,” chapter 1, for a discussion of public and academic sources for this period.

16. Asa Briggs, *They Saw It Happen, 1897–1940* (London: Blackwell, 1960), introduction, n.p. See also Asa Briggs, “Problems and Possibilities in the Writing of Broadcasting History,” *Media, Culture and Society* 2, no. 1 (1980): 5–13.

17. Graham Smith, “Remembering in Groups: Negotiating between ‘Individual’ and ‘Collective’ Memories,” in *The Oral History Reader*, 3rd ed., ed. Robert Perks and Alistair Thomson (London and New York: Routledge, 2016), 193–211.

18. Smith, “Remembering in Groups,” 207.

19. Christine Gledhill and Julia Knight, eds., *Doing Women’s Film History: Reframing Cinemas, Past and Future* (Urbana, Chicago, and Springfield: University of Illinois Press, 2015), 2. This collection of essays was produced from the first “Doing Women’s Film History” conference in 2011. There have been three further biennial conferences, “Doing Women’s Film and Television History,” which have extended the remit to include television, all of which are producing publications. For details see the Women’s Film and Television Network website: <https://womensfilmandtelevisionhistory.wordpress.com/>.

20. See for example Sherna Berger Gluck and Daphne Patai, eds., *Women’s Words: The Feminist Practice of Oral History* (London: Routledge, 1991).

21. Kate Murphy, *Behind the Wireless: A History of Early Women at the BBC* (London: Palgrave MacMillan, 2016), 18, 2, 6.

22. Edward Pawley, *BBC Engineering 1922–1972* (London: BBC Publications, 1972), 299.
23. Pawley, *BBC Engineering 1922–1972*, 300.
24. Briggs, *The History of Broadcasting in the United Kingdom*, 3:548.
25. Pawley, *BBC Engineering 1922–1972*, 300–301.
26. British Broadcasting Corporation, *BBC Year Book* (London: Broadcasting House, 1943), 88.
27. BBC WAC File R13/80/1, 1941, and File R13/80/2, 1942, “Departmental Engineering Division, Women Operators”; File R13/73 1942–1944, “Engineering Division, Technical Assistants.” Reproduced with permission from the BBC Written Archives.
28. Internal memorandum from E. F. Wheeler, Superintendent Engineer (Transmitters) to Engineers-in-Charge, 1943, quoted in Pawley, *BBC Engineering 1922–1972*, 302.
29. APTS recording no. 23. A telecine machine transfers film footage to broadcast format.
30. APTS recording no. 23. The phrase “sent to Coventry” is a colloquial expression meaning to be ostracized.
31. APTS recording no. 23.
32. Smith, “Remembering in Groups,” 195.
33. Author interview with Barbara (Bimbi) Harris, August 6, 1996.
34. APTS recording no. 5.
35. APTS recording no. 5.
36. APTS recording no. 16.
37. Rachel Blayney, “A Small Tribute to BBC Research Engineers from a Pioneer Vision Mixer,” written submission to APTS archive, n.d., n.p.
38. Author interview with Elizabeth MacGregor, December 8, 1995.
39. Author interview with Elizabeth MacGregor, December 8, 1995.
40. “Women in Tech Ops,” *BBC Staff Association Bulletin*, December 1955, 152, referenced in Kate Murphy, *Women in the BBC: A History, 1922–2002*, BBC, 2002, unpublished report. I am grateful to Kate Murphy for supplying me with this document.
41. “Women in Tech Ops.”
42. BBC Written Archives, Caversham, File R49/670 “Staff Policy, Staff Association. 1945–1949”: “Minutes of Informal Meeting Held in All Souls Church Hall between C.E., E.E.O. and the Engineering Branch Executive Committee of the B.B.C. Staff Association,” October 17, 1947, 5, item 8. Reproduced with permission from the BBC Written Archives.
43. BBC Written Archives, Caversham, File R49/670 “Staff Policy, Staff Association. 1945–1949”: “Minutes of Informal Meeting Held in All Souls Church Hall between C.E., E.E.O. and the Engineering Branch Executive Committee of the B.B.C. Staff Association,” January 23, 1948, 3, (8) Minute 2. Reproduced with permission from the BBC Written Archives.
44. See for example Sue Summers, “The Director Who Gave the Beatles Their First TV Break,” *Evening Standard* (London), July 3, 1981, 32. See also Denis Norden, Sybil

Harper, and Norma Gilbert, compilers, *Coming to You Live! Behind the Screen Memories of 40s and 50s TV* (London: Methuen, 1985), 245.

45. Sandon, "Nostalgia as Resistance," 103.

46. BEHP interview no. 100, August 30, 1989. The online partial transcription, available on the BEHP website as well as on the BFI *Screenonline*, does not include this statement by Roy Fowler. This slightly changes our understanding of the interview dynamics. It is included on the original audio recording and the verbatim transcription in the PDF file.

47. BEHP interview no. 100, August 30, 1989.

48. Rachel Blayney and Vera Seaton Reid had both died by the time I had taken up the project.

49. Clare Peters, "Mainly for Women," *TV Times* (London), February 10, 1956, 26; Mark Johns writes: "She is pretty, blonde and one of the most popular girls in the BBC." Mark Johns, "Backroom Boy Quit the BBC," *Daily Sketch* (London), February 15, 1955, 18.

50. Author interview with Barbara (Bimbi) Harris, August 6, 1996.

51. BEHP interview no. 100, August 30, 1989.

52. These included Nobby Clark, Barrie Edgar, T. Lesley Jackson, Stephen McCormack, Ronald Price, Clive Rawls, Bill Ward, and Chris Simpson, who had moved from camerawork to production. See Sandon, "From Vision to Mundanity," 166.

53. Author interview with Barbara (Bimbi) Harris, August 6, 1996.

54. On the Joint Council Unions see Briggs, *The History of Broadcasting in the United Kingdom*, 3:549. Many of the engineers were members of the Amalgamated Engineering Union (AEU).

55. ACT was formed in 1933, recruiting first among technicians in the film industry.

56. "Letter to the Editor: Women in Operations, 'Cool and Level-Headed,'" *BBC Staff Association Bulletin*, April 1948, 5. I am grateful to Kate Murphy for providing me with this source.

57. *BBC Staff Association Bulletin*, October 1948, 3. I am grateful to Kate Murphy for providing me with this source.

58. See Sandon, "From Vision to Mundanity," 171–74; Briggs, *The History of Broadcasting*, 4:279–80.

59. Murphy, *Behind the Wireless*, 122.

60. Kate Murphy, "New and Important Careers': How Women Excelled at the BBC 1923–1939," *Media International Australia* 161, no. 1 (2016): 18.

61. For materials on histories of women in film and television in Britain from 1933 to 1989, including an interview with Ada Hakeney, engineer, see the AHRC-funded "Women's Work" research project 2014–17: <http://bufvc.ac.uk/womenswork/womens-work-research-project>.

62. Pawley, *BBC Engineering 1922–1972*, 302.

63. Murphy, *Women in the BBC*. See also "Women at the BBC," <http://www.bbc.co.uk/historyofthebbc/research/culture/women>.

64. ACTT, *Patterns of Discrimination against Women in the Film and Television Industries* (London: ACTT, 1975). See also Frances Galt, "'But it's an awfully, awfully slow process': Women and the Association of Cinematograph, Television and Allied Technicians (ACTT). 1960–1989" (PhD diss., De Montford University, 2018).